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Policy Uncertainty, Information Asymmetries, and Financial Intermediation

Gerard Caprio

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Financial reform is often accompanied by other changes, including structural adjustment; the success of the combined experiment depends on the extent and efficiency of subsequent investments. Entrepreneurs' judgments about investing in a post-reform world (often affected by the costs of entry and exit and the probability that a reform will be reversed) are important but so are banks' considerations of the sunk costs of investments in both physical capital and information development.

In industrial economies in normal times, information costs are low, banks have ample information, and information is rarely destroyed (as when a large part of the banking system fails). But in developing economies, banks may possess limited information about only a few large firms, and the potential for destroying much information capital is great. Partly for this reason, some countries — especially very poor ones with undiversified financial systems — have difficulty with financial reform.

Caprio argues that policy advisors should be circumspect in forecasting rapid post-adjustment recovery, and structural adjustment and financial reform programs should consider the extent to which bank relationships are going to be disrupted, either by failing banks or by the destruction of information.

The accepted wisdom is that financial reform should not precede "real" sector adjustment, or banks will get in trouble by lending at disequilibrium prices. But postponing all financial reform until structural adjustment is complete is equally dangerous: unless the financial sector is prepared, investors will not have enough capital to invest, even given credible programs.

One potential form of preparation is an extension service for the financial sector, to give firms accounting training and to help auditing firms get started. Partial guarantees to younger firms in, say, the export sector (after devaluation) might help offset some of the risk associated with lending to new clients. The period of uncertainty should persist for only a limited time — at most, two to three years after structural adjustment; a "sunset" period should be firmly imposed on any subsidies.

Alternatively, governments could give an investment tax credit on information capital. Because information is difficult to measure, the credit would be equal to some small proportion of loans made. In effect, this would amount to the government temporarily buying down the rate for beneficiaries. Even after such a tax credit program expires, bank spreads could be expected to be sizable, since lending to newer firms is more costly than lending to a few large enterprises. But as these new firms grow, spreads should decline.

The best candidates for reform — in both real and financial sectors — are countries with more diversified banking systems. These are more likely in well-diversified economies, with no recent history of severe financial repression. Countries that have tightly limited residents' ability to hold foreign assets may face a portfolio adjustment as they ease capital controls under reform, since they are in effect introducing another potentially lower-risk asset. Countries that have had relatively open capital markets will be better off since they do not have pent-up demand for such assets.

Well-capitalized banking systems will naturally tend to fare better under reform, even though ample financial capital may not lead banks to lend aggressively in the face of greater uncertainty (such as substantially reduced information). Clear signals from reforming governments on where policies are headed will help both entrepreneurs and their financiers. Without these signals, banks will not be sure where to concentrate their investment in gathering information, and periods of loan retrenchment are more likely to be prolonged.

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I. Introduction[1]

The reform of financial markets -- including the lifting or easing of interest rate controls, portfolio requirements, and credit controls -- in many cases follows decades of government intervention and usually reflects a significant change in either policy makers or in their thinking. Thus, the analysis of the effects of financial reforms is difficult, in that they rarely take place in a vacuum, but instead often are associated with a more widespread liberalization of policies. The latter process, dubbed structural adjustment, frequently encompasses the removal of price controls, exchange rate realignment, and decreases in effective protection. As noted in several studies (such as Faini, De Melo, 1990), subsequent performance of investment often has been weaker than expected, and the financial sector routinely is regarded in countries undergoing adjustment as the culprit. Yet it is arguable that in such environments weakness in investment should hardly be surprising. Recent literature on the credibility of government policy focuses attention on the behavior of real sector investors, analyzes the factors to be weighed in their decisions to respond to new incentives, and highlights the (stringent) conditions needed to elicit investment following structural adjustment.

One limitation of this literature is its omission of banks or other financial intermediaries, or the equivalent assumption that intermediaries will behave in line with investors, i.e., that once investment decisions are made by firm owners or managers, financing will follow automatically. However, when there are information asymmetries between intermediaries and borrowers, the flow of finance may be more sluggish than assumed in the literature. In developed countries breakdown of the relationship between intermediaries and borrowers may only occur during times of extreme financial distress, as argued by Bernanke (1983) for the United States in the Great Depression and Kennedy (1989) for late 19th century Britain. In normal times, abundant sources of information allow for ample bank and nonbank financing of investment. However, in developing countries this

[1]The author acknowledges valuable comments from Izak Atiyas, Patrick Honohan, Bruce Greenwald, Ross Levine, Fabio Schiantarelli, Andrew Sheng, and Andrew Weiss, but at the same time accepts responsibility for remaining errors.

breakdown may be a more regular event, and can be quite common in the wake of a structural adjustment program or a liberalization of the financial system.

After some background on reforming economies, the present paper will review first the simple model in which banks are absent, and then turn to the case in which banks are present but know relatively little (in particular, are unable to distinguish among borrowers). Even in this framework, banks' financial condition matters in their ability and willingness to respond to investment opportunities. When banks are well informed about their credits, as in the case when they use long term relationships with their clients to acquire information about borrowers, both the information capital and the financial capital of banks affect their response. Reforms likely work better when less of these two types of capital are destroyed. Succinctly put, the success of structural adjustment depends in part on the state of the financial sector and any concomitant financial reforms that are adopted. More generally, the manner by which financial sector policies affect the real economy are highlighted. The last section notes some of the implications of this approach for financial reforms, and offers some advice on improving reform efforts.[2]

II. Background on Reforming Economies

A growing body of research in recent years has focussed on the experience with World Bank-IMF adjustment programs in the 1980s. This experience is deemed to be of special interest since it was during that period that these programs focussed more on the restoration of long-run growth, to the point that they were labelled "growth-oriented adjustment programs." As summarized in Faini, de Melo, et al. (1990), there is no evidence -- at least in the data through 1986 -- of a statistical difference in growth performance

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[2]Successful financial reform means not just avoiding the failure of banks and other parts of the financial system, but also entails a more efficient allocation of capital and, ultimately, a greater equalization of the marginal efficiency of capital throughout the economy than would have been the case otherwise. Some empirical testing of the impact of reforms on the investment behavior of firms is being undertaken as part of the research project, The Impact of Financial Reform, and will also be attempted, with far larger data sets, as part of the project, Investment Decisions, Capital Market Imperfections, and the Effects of Financial Liberalization: the Ecuadorian and Indonesian Cases, both managed by the Financial Policy and Systems Division of the World Bank.

between loan recipients and countries not receiving loans, after controlling for initial conditions and external factors.

That study also goes further and examines the investment performance of 14 countries undergoing structural adjustment programs, finding that at least two factors contributed to the disappointing performance of investment (Chart 1, which shows the I/GDP ratios for recipients and non-recipients of adjustment loans). First, the real devaluations needed to improve external balances led to an increase in the relative price of capital goods. Second, the authors argue that increased uncertainty likely led investors to keep capital abroad or in existing sectors, pending a clarification of the likely course of the reforms. Since about half of the countries (Chile, Columbia, Korea, Pakistan, Philippines, Thailand, and Zambia) underwent some form of financial reform during the 1980s, there may be a role of financial sector factors in explaining the residuals in the investment equations, as suggested below.[3]

As might be expected, a variety of factors will contribute to the determination of investment, including quite prominently the macroeconomic environment immediately preceding reforms and the macro policies adopted as part of a stabilization package. But the optimal design of any such measures cannot be specified without a clear idea of the behavior of firms and of banks. In Tunisia, for example, reforms occurred following decades of direct government intervention in allocating capital, both in the form of portfolio constraints on banks and interest rate controls, and including sectoral guidelines for investment and strict prior authorization of credits. All of these controls rendered the system only marginally more responsive to market incentives than that of the typical socialist economy. In late 1986, the Tunisian authorities began partially to free up interest rates, to ease portfolio requirements and to reduce significantly the extent of direct government intervention in credit decisions. At the same time, sweeping reforms were introduced to reduce protectionism and reform the tax system. Part of the reforms included a sharp cut in capital spending in the government's

[3]Conway (1991), it should be noted, finds an insignificant but slightly positive correlation between real investment and participation in an adjustment program.

budget, leading to a contraction of 5 percentage points in the share of GDP accounted for by public investment. Private investment fell also, so that total gross investment, which had been declining in 1985-6, plummeted by a further 26% in real terms in 1987-88, before beginning to recover at the end of the decade. Undoubtedly, then, a variety of factors were acting to determine investment outcomes, but anecdotal evidence, including reports of excess demand for government bonds and difficulties of obtaining bank loans, suggests that financial factors may have been among the important actors in this drama.

The conditions facing Tunisia were by no means extreme relative to other developing countries or certainly compared with that facing Eastern European economies today. Also, financial sector reforms can contribute to credit crunches by a roundabout route: liberalization, lax supervisory oversight, and government encouragement of lending can lead to a spurt of rapid loan growth and eventually large loan losses, ultimately producing a sharp contraction of credit. This type of scenario is argued to have occurred in the Philippines (Nascimento, 1991), which saw a 53% plunge of real credit to the private sector over a 3-year period and a concomitant fall in private investment. In contrast, countries -- and Malaysia appears to be a good case -- that eased financial regulations during relatively stable times are more likely to find investment determined by macro factors and less by bank-specific influences. The thesis advanced in the following sections is that neither the health of banks nor the means by which they acquire information about their client can safely be ignored in the adjustment process.

III. Structural adjustment without a financial sector

Recent research stresses that in countries pursuing structural adjustment policies, the credibility of government policy in general and, specifically, the probability that a given reform will be reversed, are important factors in firms' decisions to invest in the sectors to be favored as a result of the reform. The response of investment, in turn, often is judged a principal factor in determining the success of any reform. One key insight of the literature on policy uncertainty and investment is that investors will weigh the magnitude of reforms, their

ex-ante probability of sustainability, or success, and the extent of entry and exit costs.[4] The basis for the literature is the observation that investment often is largely irreversible. Potential investors in effect hold an option to invest, which they exercise by committing resources and thereby destroying the value of the option they hold, much like the exercising of a financial option. Since uncertainty always exists, there is always some value to not investing, which must be balanced against the profits foregone by "remaining on the sidelines." Policy-induced uncertainty may be especially important during the initial stages of a structural adjustment program, when the government's commitment to lowering protection or reducing a public sector deficit often is in question.

One of the key results derived is that, following structural reform, investment will take place in the newly favored sectors when the net return is sufficiently large to compensate investors for the one-time costs of entry plus the expected costs of capital reallocation in the event of a policy reversal (see Appendix). As Rodrik notes, with no entry or exit costs, this condition amounts to the popular notion that capital will relocate if the rate of return in the "new" sector exceeds that in the former one. With non-zero entry and exit costs, the larger is the probability of reversal, or the greater are reallocation costs, the greater must be the gains associated with reform, given by the change in the rate of return. Rodrik then illustrates that even small probabilities of reversal will necessitate a significantly higher rate of return when entry and exit cost are substantial. Indeed, in his example, sunk costs of entry plus exit added up to three-quarters of the cost of installed capital, in which case a mere 10% probability of reversal demands a 7.5 percentage point premium to elicit investment. This situation is better when expected reversals are small, so that capital does not find it worthwhile to relocate subsequently, but only if the discount rate of investors is quite high, so that they will value highly short-run profits, or if, as with the previous case (large expected reversals), one relaxes the assumption that collapsed reforms never revive.

Although this framework is quite simple, it underlines the importance of adopting

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[4] See Rodrik (1989), Dixit (1987), Pindyck (1988 and 1991), and McDonald and Siegel (1986).

credible reform programs and thus helps in highlighting essential, though difficult to quantify, aspects of reform. However, notwithstanding Rodrik's conclusion that "lumpy" investment costs must be countered by rapid adjustment, this approach does not provide an unambiguous answer to the debate about the optimal speed of adjustment (gradual vs. shock therapy approaches), since credibility cannot be observed or measured. Thus arguments can continue between those who believe that sticking to a slow-but-steady timetable will be more credible than dramatic programs that may be difficult to maintain. Multiple equilibria are a distinct possibility.

Another possible drawback of this literature is that once estimates of rates of return, entry and exit costs, and probabilities and magnitudes of reversals are made, investors are presumed to react instantaneously. Since bank financing often is important in many countries, especially those with underdeveloped capital markets, this amounts to the assumption that once investors become convinced as to the profitability of an investment, bankers will respond immediately with whatever financing is desired. As is argued below, such a reaction will depend on the degree of government intervention during the pre-reform period, the impact of adjustment on banks' portfolios, and the extent to which banks' information capital is impaired.

IV. Credit Rationing with "Platonic" Banks

This section focuses on the role of banks during periods of adjustment, in a world in which banks have no special information about their borrowers and there is a substantial asymmetry of information between borrowers and lenders. Following Stiglitz-Weiss (1981), it is assumed that banks, the sole lenders in this setting, are unable to distinguish among borrowers, and accord all borrowers the same loan amount.[5] Even in this artificial

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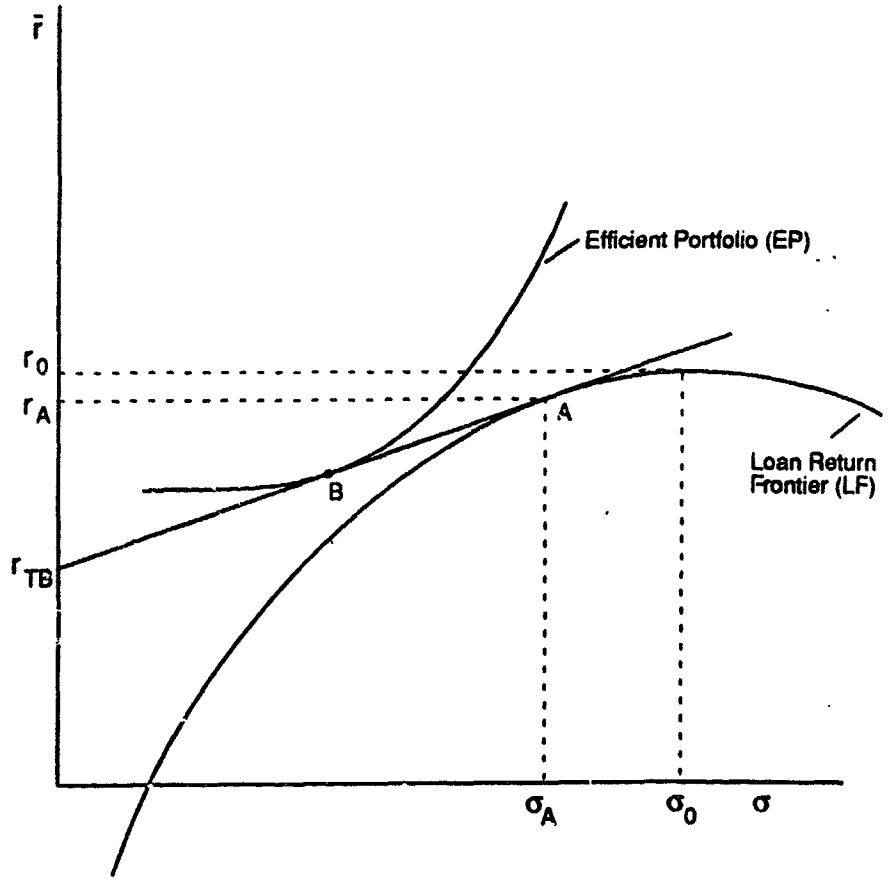
[5]Bankers in this world are like the cave dwellers in Plato's Republic who do not see the real nature of things, but only evanescent shadows on the wall. Even without becoming philosopher-kings, and even without well developed accounting and auditing systems, it is possible that bankers will acquire information on borrowers by developing long-term relationships with them. The implications of these more knowledgeable bankers are the subject of the next section.

environment, however, the health of the banking sector matters in the determination of the amount of credit extended to the private sector following reform, and hence in the success of the adjustment process. Moreover, a post-reform "credit crunch" can occur without the tightening of monetary policy that often characterizes the early stabilization phase of these programs. Indeed, the possibility of such a retreat by banks should be factored in when setting monetary policy in the early phases of reform.

Assume then that, again following Stiglitz-Weiss (1981) and Greenwald-Stiglitz (1990), adverse selection occurs, so that as the contractual rate of interest rises, eventually the quality of borrowers diminishes to the point that the effective return to the bank actually

Figure 1.



borrowers by developing long-term relationships with them. The implications of these more knowledgeable bankers are the subject of the next section.

falls. Moral hazard may account for this result as well, in that other things equal, borrowers may engage in riskier projects as the cost of borrowing rises. Thus the loan frontier (LF), which shows combinations of expected return and risk, for variations in contractual interest rates, will look something like that in figure 1, where the expected return on loans, $\bar{r}$, and the standard deviation of loan returns, σ (a measure of risk), are plotted on the vertical and horizontal axes, respectively. It is assumed that the probability of default rises with increases in contractual interest rates, so that eventually higher interest rates lead to lower expected returns on loans as the quality of the loan portfolio deteriorates. Banks have the choice of holding risky loans or riskless treasury bills that pay a return of r_{TB} without fail. Bankers are assumed to be risk averse, with declining absolute risk aversion as net worth rises.[6] Presume first that there are no controls on interest rates or portfolio decisions. If we suppose that loan demand below r_0 exceeds lending capacity of banks, then banks will ration credit, as Greenwald-Stiglitz note, with the efficient investment portfolio (EP) depicted in the figure representing combinations of the riskless asset and risky loans.[7] The interest rate on loans is given by the intersection at point A, while the fraction of bank assets going to loans and T-bills is determined at point B. Thus banks would hold a portfolio made up of risky loans paying r_A (with risk σ_A) and riskless treasury bills paying r^{TB}; the average interest rate and risk of this portfolio is given by the point B. Points to the right of (r_A, σ_A) on LF will never be chosen, as they are dominated by portfolios on the efficient frontier.[8]

Even in this simple model, liberalization of the financial sector could lead to increased credit constraints for private sector investment, though whether banks augment or decrease lending will depend on the precise nature of the controls and the reform. In the simplest

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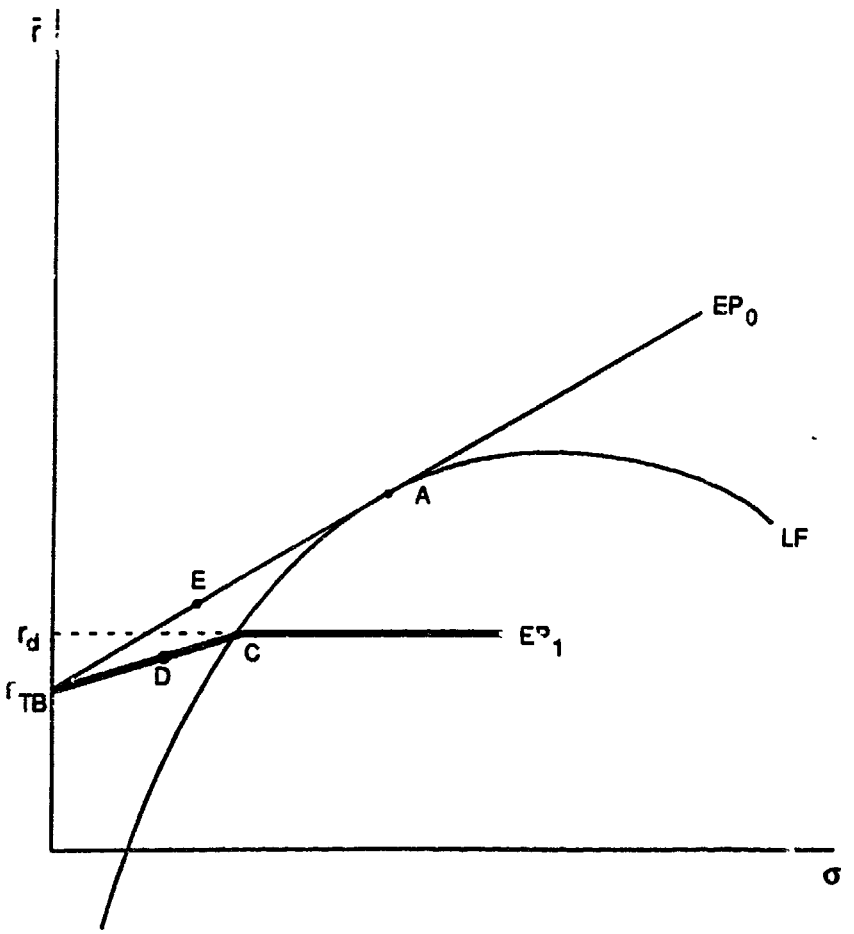
[6]In other words, the required increase in the expected return needed to leave banks indifferent decreases as net worth increases at the same risk level. In terms of figure 1, bank indifference curves becomes flatter at higher levels of net worth and a given risk.

[7]If demand were less than bank lending capacity, EP would flatten out to intersect LF (not a tangency), as shown in Greenwald-Stiglitz (1990).

[8]Banks can move to the right of point A in EP only to the extent that they can borrow at the riskless rate.

case, in which the sole form of financial sector interference was a ceiling on interest rates on loans, some expansion of credit is likely, as shown in figure 2.[9] If the interest ceiling leads to a limit on the expected return by banks, given by r_d, the top of the loan frontier curve is cut off, leaving an efficient frontier of EP_1, so that banks will operate to the left of point C (in the extreme case, a corner solution is possible if the interest rate ceiling is set at r_{TB}).[10] Removing the interest rate constraint would then lead banks to supply more loans (moving from a point like D to E): the substitution effect of higher interest rates will lead to more

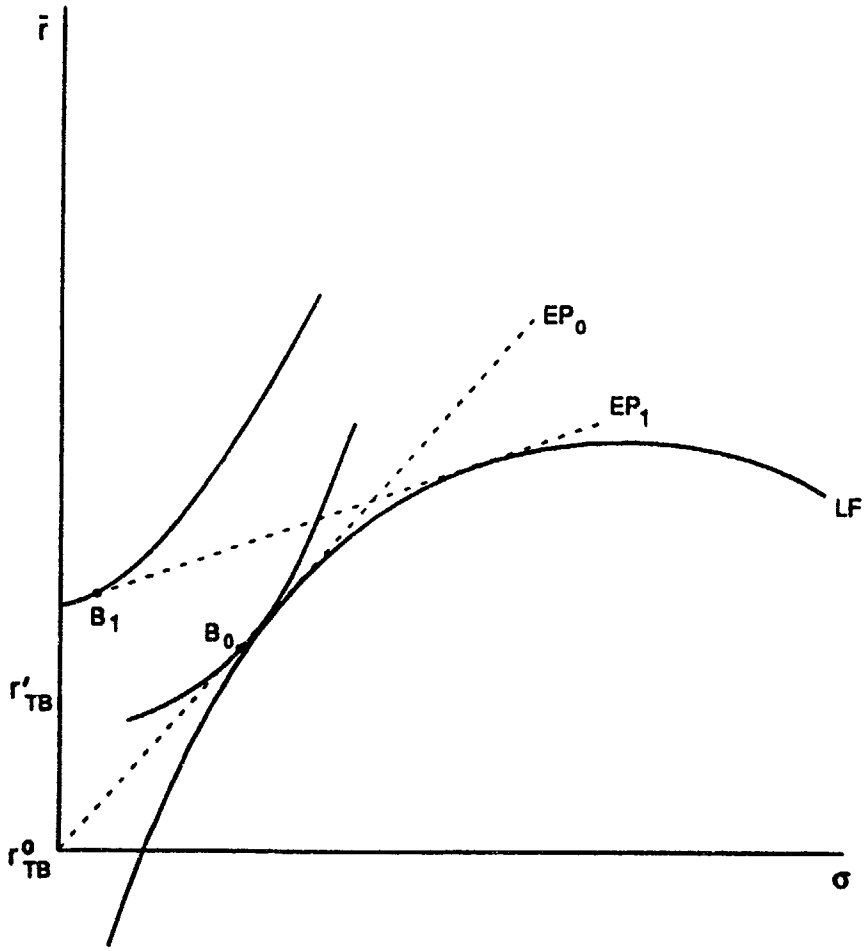
Figure 2.



[9]This discussion was materially improved by conversations with Andrew Weiss and Fabio Schiantarelli, though they still may not endorse its conclusions.

[10]Note that the expected return to banks is always less than the average interest rate on loans, given some defaults. Consequently, r_d will lie below the interest ceiling.

Figure 3.

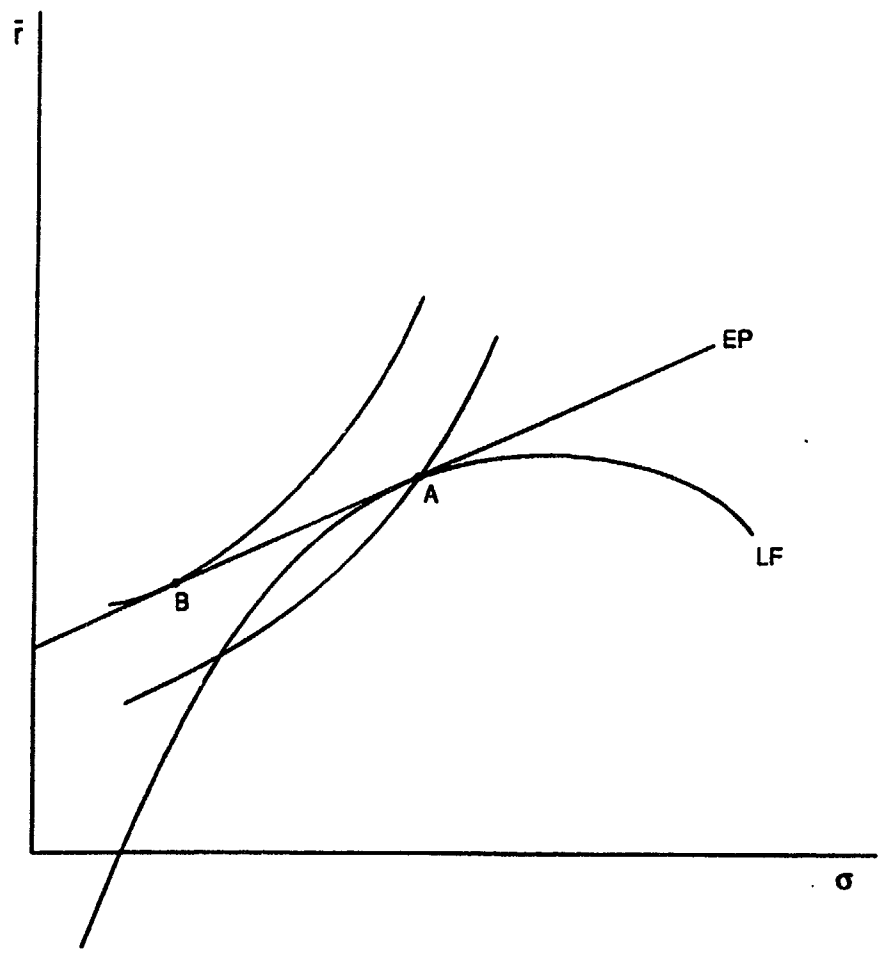


loans, as will the income effect when there is decreasing absolute risk aversion. The consequent rise in investment illustrates a simple link between financial sector adjustment policies and the real economy.

A reduced supply of loans becomes more likely if the interest rate on government paper was artificially repressed prior to reform, as is often the case. In general, the larger is the increase in r_{TB} relative to the rate on loans, the more likely it is that banks free of controls will choose to hold larger amounts of the riskless asset and supply fewer loans (in figure 3, this is captured by a move from B_0 to B_1). In other words, reforms characterized by relatively large increases in "riskless" interest rates are more likely to see a substitution away from riskier loans (a flight to government paper).

Portfolio controls also may have characterized the pre-reform world; if banks were constrained to operate at point A in Figure 4, an ending of this requirement would automatically lead them to hold less in the way of bank loans in the post-reform world, moving back to point B.[11] Correspondingly, banks forced to hold a high percentage of government paper prior to reform will likely shift towards greater lending after the constraint is relaxed, unless the interest rate on government debt is significantly raised. Again, the key point is that the manner in which the financial sector was regulated and the precise nature of

Figure 4.



[11]Banks might face interest rate ceilings on their loans and portfolio constraints as well, but this combination should admit to straightforward analysis. Forced holding of substantial amounts of government paper in the pre-reform world would more likely dispose banks to step up their lending for investment, as the share of government paper in their portfolios may well be above the desired level at the start of the process. Small increments to r_{TB} in this case would be insufficient to induce a shift.

any financial reforms will effect the rest of the economy

The foregoing analysis assumed that the loan frontier remains unchanged before and after reform. However, it should be recognized that this curve reflects banks' perception of risks and, therefore, its location will change depending on bankers' views of the riskiness of the environment. Bankers unsure about the direction of policy might well view all loans as riskier, in other words, the loan frontier might be viewed as shifting out to the right. Alternatively, adjustment policies might be depicted by a mean-preserving spread of the loan frontier. In either case, the slope of the efficient frontier then would become flatter, leading banks to shift toward holding more of the riskless asset, other things equal.[12] As will be noted below, there are some good reasons explaining the possibility that this view of increased risk could be sustained for quite some time following reform. If structural reforms instead lead to a significant and convincing upward shift of the loan frontier, a boost in bank lending would then result.

Additionally, banks' own profitability might be adversely affected by structural adjustment, especially if they have a large exposure to the declining sector. Thus banks that have lent heavily to import-competing sectors will suffer from a steep decline in tariffs, as will those with large exposures to public enterprises in the aftermath of a reduction in public sector investment. Assuming that the banks remain solvent, this would amount to an increase in the interest rate demanded to compensate for a given increment in the risk level or, in other words, a steepening of the indifference curve. Consequently, the tangency with the efficient frontier would shift to the left.[13] This case also would be highly relevant for

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[12]Structural adjustment might "just" mix up winners and losers, but only banks who can distinguish one from the other would be able to profit from such a change. As we shall see in the next section, if banks have information mainly about the declining sector, they may in effect be taxed by the adjustment and have yet another reason, and quite likely a very powerful one, to curtail lending.

[13]Stiglitz-Weiss (1988) derive a similar result in a different context. A poorly organized reform program might result in a temporary downward shift in the loan frontier, with similar results. In contrast, as is well known from the experience with U.S. Savings and Loans, if private banks are severely effected by reform so that they have negative net worth and bankers have limited liability, they may be easily tempted to bet the bank. In figure 1 this would amount to a flattening of the indifference curve and increased lending, as risk considerations become less important. Deposit insurance then would aid the banks in their speculative efforts.

banks with large loans to public enterprise sectors immediately prior to structural adjustment, to the extent that the authorities reduce public investment spending. Expected returns on loans to this sector will decline following reform, impairing banks with significant exposures to this sector.[14]

Lastly, if controls during the pre-reform period were such that most loan decisions were determined by some branch of the government -- such as the planning ministry in socialist economies or the central bank/finance ministry in countries requiring prior approval for loans -- then the banks may well have underinvested in risk assessment skills. To the extent that financial reforms led to banks being responsible for future loans losses, they might well behave exactly if they were facing a riskier loan frontier and hold a greater amount of riskless assets than might be expected. The speed of real sector adjustment in this case would depend on a variety of factors, not the least of which would be the interest on the part of foreign bankers (who at least already have the infrastructure to process information) in entering the market.

This simple model thus emphasizes first, the extent to which the investment response depends on the state of the financial sector, and second, the conditions in which greater credit restraint on the part of bankers might be an expected response to financial reform (cum structural adjustment). The possibility of a post liberalization credit crunch contrasts with the common perception, noted in Johnston (1991), that credit growth will pick up following reform. His characterization may be especially relevant when banks have been required to hold substantial amounts of government paper, as there would then be a post-reform tendency to re-balance bank portfolios. Even then, however, the response would depend on the change in the interest rate on government paper relative to the rate on loans. More generally, banks may well hesitate to lend following reform cum adjustment, and the failure to anticipate this hesitancy may produce overly optimistic forecasts of the adjustment process.

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[14]Private sector investment might also decline because of complementarities between public and private investment spending. See Serven (1991).

To the extent that banks have means of developing sources of information so that they can distinguish among different types of borrowers, this retrenchment from lending is also a distinct possibility, as elaborated below.[15]

V. Credit crunches with more informed banks

The model of the last section has some appeal in that it shows that banks' financial condition and perception of risk can affect lending and, hence, investment performance, even when banks possess so little information that they are unable to distinguish among borrowers. However, it is widely argued that banks acquire information by building long term relationships with their customers, thereby becoming acquainted not only with the underlying business, but also with the financial activities and repayment performance of the client. According to this view, banks become more informed about the risks of their borrowers, while not achieving the superior knowledge possessed by its clients. Indeed, many bank loans are not tradeable precisely because, since a bank knows its clients better than other institutions or the general public, it is presumed, in line with the "lemons" argument, that only lesser quality loans will be sold, effectively leading to the shrinkage or disappearance of this market.[16] This section argues that bank lending depends on the endowment of information banks possess -- information capital, for short -- and that reform programs should take into account their impact on this intangible capital.

Bank relationships may work to the benefit of the clients. Hoshi, Kashyap, and Scharfstein (1989, 1990, 1991), for example, find that financially-distressed firms in Japan that belonged to a group with a bank invest more than non-group firms, and that investment by group firms is less sensitive to liquidity constraints. Their hypothesis is that bank

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[15]See Hoshi, Kashyap and Scharfstein (1989).

[16]In the United States, mortgages and other standardized and collateralized loans are traded, as are bundles of unsecured small consumer loans and, at the other extreme, loans to well established, low risk firms. However, in between lies a large array of non-traded loans. Loan trading is more limited or virtually nonexistent in other countries.

relationships mitigate information and incentive problems. Also, James (1987), James and Weir (1990) and Lummer and McConnell (1989) provide empirical evidence on the valuation effects of announcements of bank-loan agreements in the United States. These papers are pathbreaking in that they demonstrate the favorable effect of lending relationships on stock prices of borrowers.[17] But the explanation that banks, through the lending approval and monitoring process, generate information about their clients is common to all three approaches.

In developing countries, where formal flows of information, such as would be conveyed by audited financial statements and stock prices, are recognized to be underdeveloped, unreliable, or nonexistent, it is quite likely that building such relationships is the most reliable means of acquiring information on firms. By engaging in lending and other banking relationships with a firm, and sometimes with its competitors or suppliers, banks can learn quite a bit about a given firm. The quality of this information, relative to what is available "in the market," depends on the type of bank and the control or influence over the firm permitted by law and by market structure.[18]

Traditionally, bank lending decisions are thought of in a portfolio balance framework, in which the demand for different bank assets, including bank loans, depends on vectors of risk and return variables, such as

$$A_i/A = f_i(\rho, \gamma) \qquad (1)$$

where

A_i = value of asset i held by a bank,

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[17]The articles differ as what types of lending results in movements in stock prices.

[18]Equity participation may be another way to acquire information, but even then there often is a difference between the information available to inside and outside shareholders.

A = total assets of the bank,

ρ = is a vector of expected rates of return on all of the potential assets, including money market instruments, government obligations, various types of loans, and real assets, and

γ = is a vector of the corresponding standard deviations of these returns.

Banks are viewed then as choosing between loans and other long and short-term instruments as part of a portfolio decision. This focus might be appropriate when the right-hand side variables can be considered to be exogenous, at least to the bank. However, both the expected return and the risk associated with a given loan often will depend both on the effort the bank puts in to monitoring its investment and the information it acquires about its clients.

Focussing on information capital suggests a different approach. Information capital of banks is built up over time through banking relationships, making it plausible to presume that the supply of bank loans depends not only on the cost and supply of resources at the banks disposition -- its capital, deposits, and the availability of borrowed funds -- the rate of return on substitutes, such as government paper, the owners' disposition to risk, and any regulatory constraints, but also on its information capital base, as this will directly affect the expected return and risk of loans.

Thus loans (L) may be viewed as an output of banks,

$$L=f(K, D, IB, r_i, r_c, IK, K*/A) \qquad (2)$$

where

K = the capital of the bank;

D = the deposit base;

IB = a vector of variables on the depth of the interbank markets;

r_i = the interest rate on interbank instruments;

r_c = the contractual interest rate on loans;

IK = the information capital of the bank, summing up both product and firm specific information relevant to lending decisions;

K^*/A = the desired or maximal capital asset ratio.

Returns to investment in information capital are assumed to be positive but diminishing. Banks then will invest in information capital up to the point where its marginal product equals the cost of additional information. These costs will include acquisition of public and client-specific information, and information processing and analysis. Uncertainty exists, but some uncertainty can be mitigated by investment in information. Up to some point, banks will both improve expected returns and reduce risk by investing in information. In industrial economies, information is relatively cheap in "normal times" and its cost varies little. There are well-established accounting systems, well-developed auditing professions, and an abundance of financial firms who research individual companies and market this research. Banks thus find it profitable to invest both in information and in information processing.

However, in developing countries, without many of these advantages, information often is at a premium. Moreover, financial repression often leads banks to underinvest in information capital. Artificially low lending rates, for example, reduce the returns to investment in information. Or, if governments are perceived to be dictating loans through various selective credit programs or a prior approval process,[19] or giving loan guarantees, bankers often believe that governments will stand behind loans in the event they become nonperforming, in which case it only pays to hire relatively few and unsophisticated loan officers and to invest little in acquiring information. Moreover, governments often direct a sizeable proportion of bank credit to certain sectors, such as state enterprises and industries producing for the domestic market (often at an overvalued exchange rate), which are rendered uncompetitive by the reductions in public investment spending and in the degree of protection associated with structural adjustment.

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[19]This procedure appears in a number of developing countries, whereby loans above a certain size (often quite small, even relative to the indigenous market) require prior authorization of either the central bank or the finance ministry.

Financial reform -- a reduction in government intervention in bank decisions -- at the very least finds banks with little information (and financial) capital. The pullback by the government often means that the banks are on their own for bearing the costs of future losses; thus from the banks' view, in terms of the model of Section III, the loan return curve shifts out to the right. At the same time, the initiation of a structural adjustment program (or any potentially severe macro shock) can wipe out a good portion of information capital by reducing the attraction of lending to large, established firms (often public enterprises, at times the only large firms in the economy), pushing the loan return curve further to the right. As we saw above, the result of such a shift is to lead banks to attempt to hold more of the riskless asset. In effect, there are two groups of firms, as in the Hoshi, Kashyap, and Scharfstein representation of Japan, namely those with relationships to banks and those without, and structural adjustment may severely reduce the attractiveness of loans to the only sector about which banks may have any information. Those banks or countries with a concentration of firms having close bank relationships concentrated in the declining sector will experience the sharpest decline of lending following reforms, unless the banks are made insolvent (in which case they likely will decide to "bet the bank") or are state-owned (in which case they may well continue to lend to loss making firms).[20]

To be sure, banks will also be affected by the impairment of their loan portfolio, but the destruction of information capital itself can be important as well, suggesting that even a government "clean up" of bank portfolios at the time of liberalization may not be sufficient to induce significant bank lending.[21] Indeed, this point is regularly overlooked in articles on reforming socialist economies, where it is argued that banks should be audited and then cleaned up and left on their own to determine their own lending behavior. But in a high risk

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[20]Gertler-Rose (1991) emphasize the importance of borrower net worth in affecting the success of liberalization efforts. This approach suggests that even if economy-wide net worth is unimpaired by reforms or other shocks, a contraction of credit might still be expected if the declining sector is the main one on which banks have information.

[21]By clean up is meant either the replacement of nonperforming loans with performing assets (often government bonds) or the writing down of bad assets and an equivalent removal of liabilities from the balance sheet of the banking system.

environment, where many if not all of the state enterprises -- the only large enterprises in the country -- have become decidedly risky businesses (absent a government guarantee), it is all too likely that unregulated banks will choose to hold safe assets as much as possible and to lend relatively little. This abrupt retrenchment by banks may well be inappropriate for macroeconomic reasons.[22]

As time passes banks will build up their information capital, assuming that they face the right incentives. The rebuilding of information capital will depend on the:

- the availability and accuracy of accounts;
- the stability of relative prices; and
- the returns to investments in information.

Thus, the loan return curve will gradually shift back in to the left, leading to a diversification away from safer assets. However, this shift might be a slow process. The more concentrated the pre-reform banks' portfolio in the dying sectors, the greater the expected destruction of both financial and information capital and the slower is the expected recovery. In economies where investment in all of the large firms is rendered unprofitable, banks will be left with smaller -- though potentially rapidly growing -- firms about which they have little information. That these small firms themselves have little knowledge of how to keep proper records, deal with banks, or fill out loan forms will further retard the recovery process. Post-adjustment economies might then for quite some time remain in "low lending" traps, despite the assertions by entrepreneurs that there are a number of profitable investment opportunities. Prior to or early in the adjustment process, governments should focus attention on reducing the cost of information capital to the financial sector.[23]

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[22]Of course, a retrenchment might not be the worst prospect. Banks can continue to lend to insolvent enterprises after reforms, possibly on instruction from the government, and thus retard the needed real-sector change. Even evergreening unpaid debts will inhibit bank's ability to lend to other firms in the presence of bank-by-bank credit ceilings.

[23]Equity can help to spread risk, but there is little evidence that equities can become significant without some way to monitor investments, which is where banks appear to excel.

This type of low-lending trap can be obtained from another approach, as noted by Lang and Nakamura (1990), in which lenders only make loans based on information available to all market participants, namely on projects' current returns and those realized during previous periods. Their model is markedly more neoclassical than the present approach, and they assume that borrowers have no incentive to misrepresent returns. In their approach, the inflow of information is based on the flow of new loans, so that any shock that depresses lending in the current period tends to perpetuate itself, that is, a decline in the number of projects leads to a decline in information, which in turn feeds back to increase the risk of future projects and reduces further the number of new loans. This learning effect can persist, and may be initiated by a variety of shocks, not the least of which may be the measures associated with a structural adjustment program, mentioned above. Moreover, this model shares the feature of the present one that low-lending traps likely will be more pronounced or longer-lasting when markets for information are underdeveloped, that is, in developing countries.

VI. Implications for Financial Liberalization

Financial reform often is accompanied by other changes as well, including structural adjustment programs, and the combined experiment may be judged a success or failure depending on the extent and efficiency of the ensuing investment. This paper argues that even after factoring in the decisions of firms, lenders' reactions should be considered as well. The approach by Rodrik and others is revealing: hysteresis, associated with entry and exit costs, and the relation of these costs to the probability that a reform will be reversed undoubtedly matter in entrepreneurs' judgements about investing in a post-reform world. However, it is useful to note that their judgements are not the only ones that matter. In addition to the sunk costs of physical capital investment, there are also sunk costs of information development which banks must consider. These sunk costs are often ignored in industrial economies in "normal" times because information costs are low and banks are assumed to possess ample information about all sectors of the economy. In the latter environment, the destruction of information would be a rare event, such as with the failure of

a large part of the banking system, as portrayed by Bernanke (1983). But in developing economies, where banks may possess limited information about all but a small number of large firms, the potential for a destruction of a significant amount of information capital is great. The utility of the present approach is that it may help to explain why some countries, such as very poor ones with undiversified financial systems, can have difficulty with financial reform; this knowledge may, in turn, assist in the construction of more successful reform programs.

It is important to note that this approach does not imply that abrupt changes in relative prices should be avoided, but rather that the encouragement of banks to develop links based on distorted prices is more costly than commonly realized. Thus this approach argues that: (1) policy advisers should be properly circumspect in their forecasts of rapid post-adjustment recoveries; and (2) structural adjustment/financial reform programs should take account of the extent to which bank relationships are going to be disrupted, either by failing banks or by a destruction of information. Accepted wisdom is that financial reform should not precede "real" sector adjustment, because to do otherwise will lead banks to get into trouble by lending at disequilibrium prices. However, the view that all financial reforms can wait until after structural adjustments are complete is equally dangerous. Credible programs without some basic preparation of the financial sector may find Rodrik-style investors ready to invest but without sufficient capital or other financial resources.

One form of preparation would be a financial sector extension service, offering accounting training to firms and helping with the start up of auditing firms. Partial guarantees to younger firms in, for example, the export sector (following a devaluation) might help offset some of the risk associated with lending to new clients.[24] Since this period of uncertainty would only be expected to persist for a limited period of time -- say at most 2-3 years following structural adjustment -- a firm "sunset" period should be imposed on any

[24]However, full guarantees would undermine the banks' incentives to invest in information gathering and monitoring.

subsidies. Alternatively, governments could give an investment tax credit in information capital; only since information is difficult to measure, the credit would be equal to some small proportion of loans made (again, perhaps to new clients in specific sector). In effect, this would amount to the government temporarily buying down the rate for the beneficiaries. Even following the expiration of such a tax credit program, it could be expected that bank spreads would be sizable, since lending to newer firms is more costly than a few loans to large enterprises. But as these new firms grow, spreads would be expected to decline.

Countries that are good candidates for successful reforms -- in both real and financial sectors -- are those with more diversified banking systems, which tend to be those in well-diversified economies and without a recent history of severe financial repression. Countries that have tightly limited the ability of residents to hold foreign assets may face a portfolio adjustment if they ease capital controls at the time of reform, as they are in effect introducing another potentially lower risk asset, in terms of the approach of Section III. In this sense, countries with a history of relatively open capital markets will be better off in not having a "pent up demand" for such assets, in addition to the mitigating effects thereof on the degree of repression. Well capitalized banking systems naturally will tend to fare better facing reforms, though even a high degree of financial capital may not lead banks to be more aggressive lenders in the face of an increase in uncertainty (i.e., a substantial reduction in their information capital). Clear signals from reforming governments on the direction of policies will help both entrepreneurs and their financiers. Absent these signals, banks will not be sure where to be concentrating their investment in rebuilding their information capital stock, leading in all likelihood to longer periods of retrenchment in the loan market.

Appendix

Following Rodrik (1989), consider the situation in which investors have the choice of either investing abroad, which yields a certain return, r*, or of holding physical capital.[25] The latter pays a pre-reform return of $r - t_0$, where r represents the marginal product of capital and t_0 the impact of the policy distortion, such as an overvalued exchange rate or an import-substitution program.[26] The tax equivalent value of this distortion following the reform declines to t, where it remains as long as the reform is not reversed. Let π represent the probability that the adjustment program will be reversed, in which case it is supposed that the return on capital reverts to $r - t_0$ and remains there forever, admittedly an unrealistic assumption. If V_1 denotes the value to holding a share of capital in the economy at the moment a reform is introduced and V_1^R denotes the value of the same investment in the event that the reform is reversed, then, as Rodrik shows, the discounted value of being invested is:

$$V_1 = [(r-t) - \pi(V_1 - V_1^R)]/\rho \qquad (1)$$

where ρ is the discount rate, $V_1 - V_1^R$ is the capital loss in the event of a reversal, and $\pi(V_1 - V_1^R)$ is the expected value of the loss per unit of time. If the exit costs per unit of capital are given by θ, then investors will relocate capital (move back into the instrument with the riskless return) after a reversal if

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[25]The key feature of the first asset is that its return is invariant with respect to structural adjustment measures. In fact, even the domestic currency value of foreign assets may be effected by the success or failure of structural adjustment policies, as will be domestic treasury bills, another candidate as a standard for a "risk-free" rate of return.

[26]Clearly, a two-sector model would do more justice of the complexity of the situation, as returns in different sectors will behave differently following adjustment. But the simplification in the text holds as long as reform boosts the average return to capital in the economy, or equivalently the return to owning a share in an economy-wide mutual fund.

$$r - t_0 < r^* - \rho\theta \qquad (2)$$

or, in other words, if the returns to remaining invested are less than those of disinvesting, taking account of the exit costs. Capital will remain invested if reversals are expected to be small, and revert to the riskless asset otherwise. Rodrik then analyzes the position of an investor with capital in the riskless asset, to see under what conditions capital will relocate.

Assuming that investment will be forthcoming if $V_1 \geq V_0 + \epsilon$, where ϵ represent entry costs per unit of capital, this condition reduces to

$$(r - t) - r^* \geq \pi(\epsilon + \theta) + \epsilon\rho \qquad (3)$$

when potential reversals are sufficiently large to make it worthwhile for investors to move their capital out of the sector (or economy). In this terminology, t, the tax equivalent of the policy-induced distortion, must be low enough in the post-reform world so that the net return on investment becomes great enough to compensate investors for the one-time costs of entry $(\epsilon\rho)$, and for the expected costs of capital reallocation in the event of a policy reversal $(\pi(\epsilon + \theta))$. As Rodrik notes, with no entry or exit costs, the right-hand-side of equation (3) is 0, so that the condition would amount to the popular notion that capital will relocate if the rate of return in the "new" sector exceed that in the former one. With non-zero entry and exit costs, the larger is the probability of reversal, or the greater are reallocation costs, the greater must be the gains associated with reform, given by the change in return. As noted above, even small probabilities of reversal will necessitate a significantly higher rate of return when entry and exit cost are substantial.

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